Tattoo Recognition Technology – Best Practices (Tatt-BP)

Guidelines for Tattoo Image Collection

Revision 1.0

Purpose

- What?
  - The Tatt-BP activity provides best practice guidelines on how to collect good quality tattoo images. Artifacts include:
    - This slide deck
    - Poster
    - Document
    - All materials available at http://www.nist.gov/itl/iad/ig/tatt-bp.cfm
  - Good quality = good for forensic investigations + good for automated tattoo recognition

Purpose (cont'd)

- Why?
  - Lack of consistency in collection methodology and poor quality images can be detrimental to automated tattoo matching methodologies that could be used to support operations
  - While some problems may be rectified with post-capture image processing, certain properties cannot be recovered after the photograph is taken
  - This document serves as a guide for collecting tattoo images and identifying problems. It also provides suggestions for rectification.
    - Some problems can be fixed with the appropriate capture environment while others by real-time image recapture

Caveat

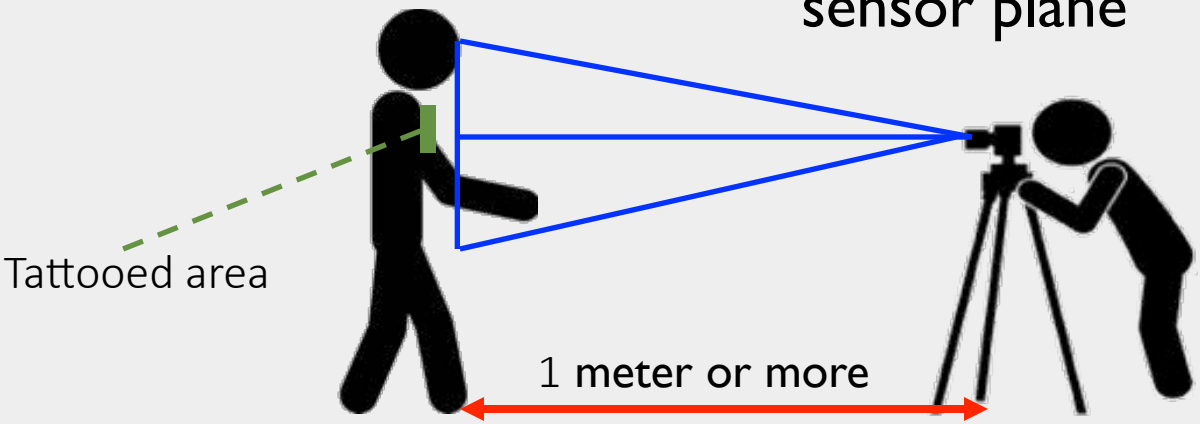
- While this guide provides recommendations on handling acquisition issues commonly seen in operations, there may exist a small fraction of circumstances that are not covered in this document.

Image Format and Resolution

- Format
  - JPEG format (with compression ratio of 15:1 or less)
- Resolution
  - Minimum of 1920 x 2560 (or 2560 x 1920) pixels or larger (5 Megapixels or larger)
  - Supports potential post-collection zooming or cropping

Camera Position

- Standoff Distance
  - The camera should be placed at least 1 meter (3.3 feet) or more away from the subject to mitigate perspective distortion
- Camera
  - Align the camera height and angle according to the location of the tattoo on the body such that the tattoo is parallel to the camera's sensor plane



Lighting

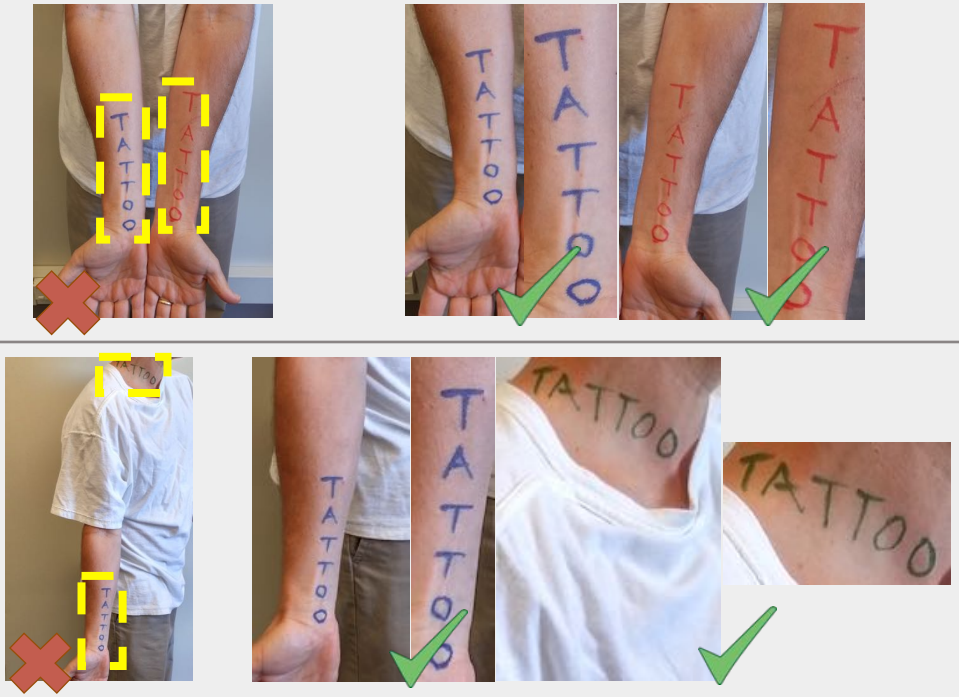
- Use uniform, diffuse lighting where intensity of light is evenly distributed
- Ideally, use a minimum of two point-balanced light sources
- Achieve lighting level of 500 lux or more
  - Similar to lighting in a bright office
  - A lux meter can be used for measuring illuminance

Number of Photographs

- For each tattoo, collect at least 2 photographs
  - Photo #1: Tattoo is far enough away to show the body location
  - Photo #2: Tattoo is centered and occupies at least 75% of the image
- Linking two or more images of the same tattoo
  - Use ANSI/NIST-ITL Type-10 record, Field 10.039
  - Field used to link two or more images of the same tattoo by using the same index reference for all of the associated images in a transaction

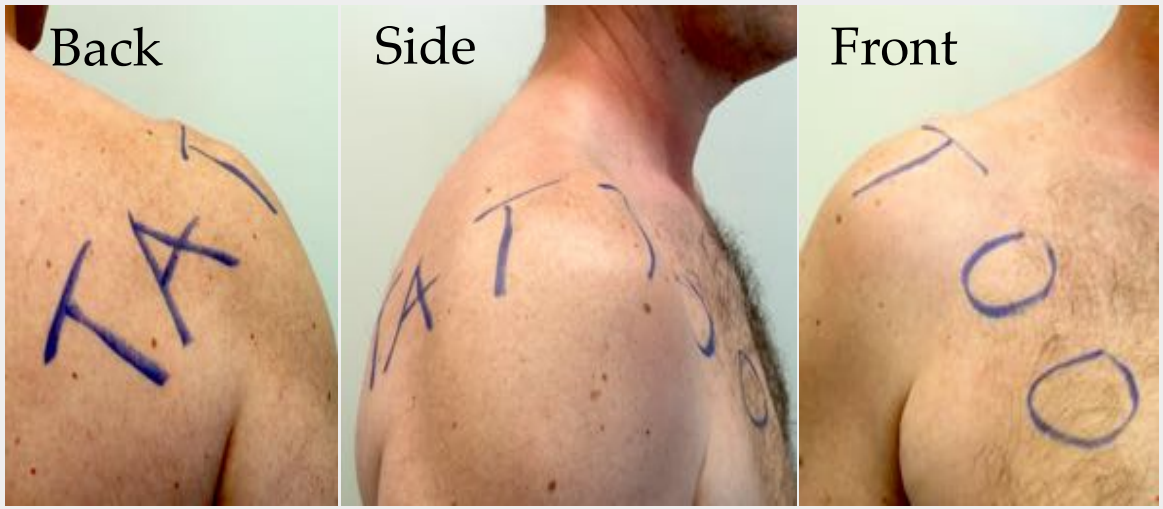
Multiple Tattoos

- For distinctly separate tattoos on different body locations
  - Collect separate photographs for each tattoo (far away and close-up)



Multipart Tattoos

- For tattoos that span multiple body locations and it's not possible to capture the entire tattoo from a single angle
  - Collect multiple images from different location viewpoints, with overlap where possible



Full-body Tattoos

- For large or full-body tattoos, collect
  - An image of the entire tattooed area
  - Additional images of smaller areas of the tattoo that may be of interest

Manual Cropping

- In the event close-up photographs are not collected, manual cropping of the image with an image editor is an acceptable alternative

Background

- Ensure the background is
  - Plain and solid in color
  - Does not contain any patterns, furniture, clothing, other body parts

Illumination

- Ensure adequate, uniform lighting such that
  - The tattoo is clearly visible
  - There is good contrast between tattoo and skin
- Ensure no large shadows or reflections over the tattoo
- In general, the camera flash should not be used

Orientation/Body Positioning

- For consistency, tattoos on body limbs should be captured with the body part parallel to the torso
  - Instruct subject to stand upright, with both forearms and hands pointing towards the ground

Focus

- Ensure the tattoo is in clear focus
- To prevent motion blur
  - Instruct the subject to remain still during photo capture
  - Ensure operator holds the camera still – use a fixed mount or tripod
- To prevent focus blur
  - Ensure the subject is at least 1 meter (3.3 ft) from the camera
  - Use autofocus and review the image

Sensor Plane

- Ensure tattoo is captured parallel to the camera's sensor plane
  - Adjust subject body position or adjust camera position
  - Tattoo should be in straight view and not at a vertical or horizontal angle
- If tattoo is too large and parts of the tattoo aren't parallel to the sensor plane (often on arms and legs), then collect from multiple angles (see Multipart Tattoos slide)

Body Hair

- Hairy regions that are not part of the tattooed region should be avoided as it can introduce noise during automated tattoo segmentation
- If irrelevant body hair cannot be avoided to expose body location, then try to eliminate it from the camera's field of view in the close-up photo (#2)

Transmission

- Post-collection, we recommend storage and transmission of tattoo images to law enforcement agencies (e.g., FBI) using the ANSI/NIST-ITL Standard Type-10 record, available at http://www.nist.gov/itl/iad/ig/ansi_standard.cfm

Summary: A Good Tattoo Image has…

- Plain, solid background
- Adequate, uniform lighting
- In focus, good contrast against the skin
- No occlusions or irrelevant body hair in view
- Tattoo is parallel to camera's sensor plane
- No shadows or reflections over tattoo

References

- NIST tattoo homepage
  http://www.nist.gov/itl/iad/ig/tattoo.cfm
- For best practice guidelines on tattoo image collection
  http://www.nist.gov/itl/iad/ig/tatt-bp.cfm
- For outcomes and recommendations from Tattoo Recognition Technology – Challenge (Tatt-C)
  - NIST Interagency Report 8078 available at http://www.nist.gov/itl/iad/ig/tatt-c.cfm
- For transmission of tattoo images with law enforcement agencies
  - ANSI/NIST ITL Standard (see Type 10 record)
  - http://www.nist.gov/itl/iad/ig/ansi_standard.cfm